भारतीय मानक
Indian Standard

IS 16919 : 2018

मैन्कोजेब + कार्बेन्डाज़ीम, आर्द्रकरणीय पाउडर (डब्लु पी) — विशिष्टि

Mancozeb + Carbendazim, Wettable Powder (WP) — Specification

ICS 65.100.30

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

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Pesticides Sectional Committee, FAD 01

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Division Council.

Mancozeb + Carbendazim powder is a fungicide for agricultural use.

Mancozeb + Carbendazim wettable powder is generally manufactured to contain Mancozeb 63 percent *m/m* and Carbendazim 12 percent *m/m*.

In the formulation of this standard, due consideration has been given to the provisions of *Insecticides Act*, 1968 and the Rules framed there under. However, this standard is subject to the restrictions imposed under the *Insecticides Act,* 1968 and Rules, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MANCOZEB + CARBENDAZIM, WETTABLE POWDER (WP) — SPECIFICATION

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for the Combination formulation of Mancozeb + Carbendazim, Wettable Powder.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

IS No.	*Title*
460 (Part 1) : 1985	Test sieves: Part 1 Wire cloth test sieves (*third revision*)
1070 : 1992	Regent grade water (*third revision*)
2771 (Part 1) : 1992	Corrugated fibreboard boxes: Part 1 General requirements (*second revision*)
6604 : 1991	Code for packaging of solid pesticides (up to 1 000 g) (*first revision*)
6940 : 1982	Method of tests for pesticides and their formulations (*first revision*)
8190 (Part 1) : 1988	Requirements for packaging of pesticides: Part 1 Solid pesticides (*second revision*)
8445 : 1991	Pesticide — Carbendazim (MBC), technical — Specification
8707 : 1978	Specification for mancozeb, technical
10627 : 1983	Method of sampling for pesticides formulations

3 REQUIREMENTS

3.1 Constituents

3.1.1 The material shall consist of mancozeb technical, carbendazim technical, together with wetting agent (s), suitable carrier (s) and, other formulant (s).

3.1.2 Mancozeb technical and carbendazim technical employed in the manufacture of the material shall conform to IS 8707 and IS 8445.

3.2 Physical

The material shall comply with the physical requirements specified in **3.2.1** to **3.2.4**

3.2.1 *Description*

The material shall be in the form of pale yellow powder, free from hard lumps and shall wet readily on mixing with water providing a suspension suitable for use as spray.

3.2.2 *Sieving Requirement*

When determined by the method specified in **11.1** of IS 6940 the amount of material passing through 75 micron IS sieve [*see* IS 460 (Part 1)], shall not be less than 98 percent by mass.

3.2.3 *Suspensibility*

The suspensibility shall not be less than 75 percent by mass, when tested by the method specified in **11.2** of IS 6940

3.2.4 *Wettability*

The time, when the whole material gets completely submerged in water, shall not exceed 60 seconds when tested by the method specified in **11.4** of IS 6940.

3.3 Chemical

The material shall comply with the chemical requirements specified in **3.3.1** and **3.3.2**.

3.3.1 *Mancozeb and Carbendazim Content*

When determined by the method prescribed in Annex A for mancozeb content and Annexure B for carbendazim content, the observed mancozeb percent (*w/w*) and carbendazim content, percent (*w/w*) of any of the samples shall not differ from the declared nominal value by more than the percent tolerance limits indicated below:

Nominal Value, Percent	*Tolerance limits,* Percent of the Nominal Value
Up to 9	+ 10 – 5
Above 9 and below 50	± 5
50 and above	+ 5 – 3

3.3.2 *Acidity or Alkalinity*

When tested by the method specified in **11.3** of IS 6940, the acidity (as H_2SO_4) or the alkalinity (as NaOH) of the material shall be 0.5 percent by mass, Max.

4 PACKING

The material shall be packed in trilaminated pouches comprising of PET, aluminium foil and LDPE. The pouches shall be heat sealed to make it leak proof and pilfer proof. The trilaminated pouches up to 1 kg capacity shall be inserted in card board carton as secondary pack. All types of containers shall further be packed in Corrugated fiberboard boxes as per IS 2771 (Part 1). The container shall also comply with the general requirements specified in IS 8190 (Part 1).

5 MARKING

5.1 The container shall bear legibly and indelibly the following information in addition to the information as is necessary under the *Insecticides Act,* 1968 and Rules framed thereunder:

a) Name of the material;
b) Name and address of the manufacturer;
c) Batch number;
d) Date of manufacture;
e) Date of expiry;
f) Net quantity;
g) Nominal mancozeb and carbendazim content, percent (*m/m*);
h) Cautionary notice as worded in the *Insecticides Act*, 1968, and Rules framed thereunder; and
j) Any other information required under the *Legal Metrology (Packaged Commodities) Rules,* 2011.

5.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

5.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

When freshly manufactured material in bulk quantity and/or the retail pack of the formulated product is/are offered for inspection, representative sample of the material shall be drawn and tested as prescribed in IS 10627, and if tested within 90 days of its date of manufacture, the criteria for conformity shall be that the contents, in percent (*m/m*), shall not be less than the declared nominal value. The upper limit for conformity shall be the same as those given in **3.3.1**.

When the material is offered for inspection after 90 days of its manufacture, sampling shall be done as prescribed in IS 10627.However, the criteria for conformity of the material, when tested, shall be the limits of tolerances, as applicable on the declared nominal value as given under **3.3.1**.

7 TESTS

7.1 Tests shall be carried out by the methods referred to in **3.2.2** to **3.2.4**, **3.3.1** and **3.3.2**.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and reagent grade water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities, which affect the results of analysis.

ANNEX A

(*Clause* 3.3.1)

DETERMINATION OF MANCOZEB CONTENT

A-1 PRINCIPLE

Mancozeb is digested with sulphuric acid and liberated carbon disulphide is absorbed in alcoholic potassium hydroxide. Potassium methyl xanthate so produced is titrated with iodine.

A-2 APPARATUS

A-2.1 Mancozeb Determination Assembly

The apparatus shall be as described in IS 8707 and consists of a 200 ml flask fitted with condenser with outlet tube connected to two absorbers and a 500 ml filter flask serving as a bubbler. The latter in turn is connected to a source of mild suction.

A-2.2 Glass Vial — 15 mm × 25 mm

A-2.3 Standard Glassware

A-3 REAGENTS

A-3.1 Lead Acetate Solution — 10 percent (*m/v*)

A-3.2 Sulphuric Acid — 1.1 N

A-3.3 Solution of Potassium Hydroxide in Methanol — 2 N

A-3.4 Dilute Acetic Acid — 30 percent (*v/v*)

A-3.5 Standard Iodine Solution — 0.1 N

A-3.6 Starch Indicator Solution — Freshly prepared

A-3.7 Phenolphthalein Indicator Solution — 1 percent (*m/v*) in 95 percent ethyl alcohol.

A-4 PROCEDURE

A-4.1 Determination of Blank

Pipette 25 ml of the 2 N methanolic potassium hydroxide solution in a 500 ml wide mouth Erlenmeyer flask containing 250 ml distilled water. Add 3 drops of phenolphthalein indicator solution and titrate with 30 percent acetic acid solution till just neutral. Add 5 ml starch indicator solution and titrate against 0.1 N iodine solution. If more than 0.1ml of iodine solution is consumed, the methanolic potassium hydroxide solution cannot be used for the determination of mancozeb content.

A-4.2 Determination of Active Ingredient

Transfer by pipette 25 ml of 10 percent lead acetate solution to the lead acetate trap (Absorber No. 1) and 25 ml of 2 N potassium hydroxide to the potash trap (Absorber No. 2). Transfer a quantity of sample equivalent to 0.2 to 0.3 g of mancozeb to an accurately weighed clean dry glass vial. Wipe the outside of the vial with a tissue and reweigh the vial plus the sample accurately to determine the exact mass of the sample. Place the vial in the 200 ml flask and connect it back to the assembly. Close the needle valve and connect the assembly to the vacuum line. Slowly, open the valve and adjust the rate of bubbling in the absorbers to 2 to 6 bubbles per second. Turn on the cooling water and maintain the temperature of the water jacket at 10°C (±2°C) throughout the experiment. By graduated cylinder, add carefully 50 ml of boiling 1.1 N sulphuric acid through the inlet tube of the distillation head. Make sure that the inlet tube dips in the liquid. Turn on the heating mantle and heat carefully so as not to allow the solution to spurt into the condenser. Continue the heating and bubbling for exactly one hour and 45 minutes. After the digestion is completed, quickly disconnect the potash trap and rinse the contents into a 500 ml Erlenmeyer flask, containing about 250 ml distilled water. Add 3 drops of phenolphthalein indicator solution and titrate the solution immediately with 30 percent acetic acid until the solution is just neutral. Cool and then titrate the neutralized solution immediately with 0.1 N iodine solution using starch indicator till the colour changes to violet.

Calculation:

$$\text{mancozeb content, percent by mass} = \frac{(V_1 - V_2) \times N \times 13.551}{M}$$

where,

$V1$ = Volume of iodine solution required for the sample, in ml;

$V2$ = Volume of iodine solution required for the blank, in ml;

N = Normality of the iodine solution used; and

M = Mass of the sample taken for the test, in g.

ANNEX B

(*Clause* 3.3.1)

DETERMINATION OF CARBENDAZIM CONTENT

B-1 PRINCIPLE

The purity of carbendazim can be estimated by high performance liquid chromatograph with a ultraviolet (UV) detector by external standard technique. Other methods like perchloric acid non-aqueous titration (*see* IS 8445) may not be valid as the interference from other ingredients leads to non-detection of end point.

B-2 APPARATUS

B-2.1 High Performance Liquid Chromatograph

A High Performance Liquid Chromatograph (HPLC) equipped with a constant flow pump, a constant volume injector (20 µl Loop), ultraviolet (UV) detector adjusted to 283 nm wavelength and a recorder (digital integrator or other data handling device) is used for this determination. The suggested operative parameters are as follows, but can be changed if necessary provided standardization is done.

Column : C-18, 250 × 4.6 mm, 5µ or equivalent.

Mobile phase : Acetonitrile : Water (containing ortho phosphoric acid) : 70 : (29+1) *v/v*

Flow rate : 1.0 ml/min. Wavelength : 283 nm. Injector volume : 20 µl

B-2.2 Analytical Balance

B-2.3 Microlitre Syringe — 25 µl capacity

B-2.4 Filtering Apparatus for Sample Standard Solutions

B-2.5 Ultrasonic Bath

B-2.6 Standard Glassware

B-3 REAGENTS

B-3.1 Acetonitrile — HPLC grade

B-3.2 Water — HPLC grade

B-3.3 Methanol — HPLC grade

B-3.4 Carbendazim Reference Standard — of known purity

B-3.5 Ortho Phosphoric Acid — AR grade (85 percent).

B-4 PROCEDURE

B-4.1 Preparation of Mobile phase

Add 10 ml of orthophosphoric acid in 1 l of measuring cylinder containing 290 ml of water. Dilute it to the mark with acetonitrile. Sonicate for 15 min.

B-4.2 Preparation of Carbendazim Reference Standard Solution

Weigh accurately about 50 mg (± 2 mg) of carbendazim reference standard of known purity in a 100 ml volumetric flask. Add 2 ml orthophosphoric acid followed by 40 ml methanol. Sonicate for 15 min. Dilute up to the mark with methanol. Transfer 5 ml of this solution into a 25 ml volumetric flask, dilute up to the mark with mobile phase.

B-4.3 Preparation of Sample Solution

Weigh accurately about 400 mg (± 15 mg) of mancozeb + carbendazim wettable powder (WP) formulation sample in a 100 ml volumetric flask, add 2 ml orthophosphoric acid followed by 40 ml methanol. Sonicate for 15 minutes, cool the solution at room temperature and dilute up to the mark with methanol. Filter through Whatman filter paper number 42. Take 5 ml of this filtrate solution and transfer to a 25 ml volumetric flask, dilute up to the mark with mobile phase.

B-4.4 Estimation

Equilibrate the column with mobile phase for 45 minutes before injecting the standard. After the column has equilibrated and a stable baseline is obtained, inject, in duplicate, 20 µl each standard and sample solution.

B-4.5 Indicative Elution Order

Carbendazim : 1.9 min Total run time : 5.0 min

From the chromatograms, of the standard and sample solution measure the peak area of the active ingredient and calculate the percentage of the active ingredient as given in the calculation.

B-5 CALCULATION

$$\text{Carbendazim content, percent by mass} = \frac{M_1 \times A_2 \times P}{M_2 \times A_1}$$

where

M_1 = weight of carbendazim reference standard, in mg.

M_2 = weight of sample taken, in mg;

A_1 = Peak area of carbendazim in standard preparation;

A_2 = Peak area of carbendazim in sample preparation; and

P = Purity of carbendazim reference standard, in percent.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	265 0206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
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